

**We claim:**

1. A flash-memory card-reader system comprising:  
a hard disk controller interface;  
5 a buffer coupled to the hard disk controller interface;  
a processing unit coupled to the buffer; and  
a flash-memory card-controller unit coupled to the buffer and to the processing  
unit;

wherein the transfer bus interface is operable to communicate with a hard disk  
10 controller in a host system, wherein the transfer bus interface is operable to receive  
incoming commands from the hard disk controller; and

wherein the processing unit is operable to translate the incoming commands to  
produce translated incoming commands usable by the flash-memory card-controller unit,  
wherein the processing unit is operable to provide the translated incoming commands to  
15 the flash-memory card-controller unit.

2. The flash-memory card-reader system of claim 1;  
wherein the hard disk controller comprises an IDE/ATA controller; and  
wherein the incoming commands are ATA commands.

20 3. The flash-memory card-reader system of claim 1;  
wherein the hard disk controller comprises a SCSI controller; and  
wherein the incoming commands are SCSI commands.

25 4. The flash-memory card-reader system of claim 1;  
wherein the flash-memory card-controller unit is operable to access a flash  
memory card in response to the translated incoming commands.

30 5. The flash-memory card-reader system of claim 1, further comprising:  
a housing comprising at least one slot for receiving a flash-memory card;  
wherein the flash-memory card-controller unit is coupled to the housing;

wherein the flash-memory card-controller unit is operable to access the flash-memory card in response to the translated incoming commands.

5        6.        The flash-memory card-reader system of claim 5, wherein the hard disk controller interface, the buffer, the processing unit, and the flash-memory card-controller unit are comprised in the housing.

10       7.        The flash-memory card-reader system of claim 5, wherein the flash-memory card comprises one of a Compact Flash Card, a Secure Digital Card, a Multi Media Card, a Smart Media Card, and a Memory Stick Card.

15       8.        The flash-memory card-reader system of claim 1, further comprising:  
a housing comprising one or more slots, wherein each respective one of the one or more slots is configured to receive a respective flash-memory card;  
wherein the respective flash-memory card comprises one of the following types:  
         Compact Flash;  
         Secure Digital;  
         Multi Media;  
         Smart Media; and  
20       Memory Stick; and  
wherein the flash-memory card-controller unit is operable to access the respective flash-memory card in response to the translated incoming commands.

25       9.        The flash-memory card-reader system of claim 1, further comprising:  
a housing comprising one or more slots, wherein each respective one of the one or more slots is configured to receive a respective flash-memory card;  
wherein the respective flash-memory card comprises one or more of the following types:  
         Compact Flash;  
30       Secure Digital;  
         Multi Media;

Smart Media; and  
Memory Stick; and

wherein the flash-memory card-controller unit is operable to access the respective flash-memory card in response to the translated incoming commands.

5

10. The flash-memory card-reader system of claim 1;  
wherein the flash-memory card-reader system appears as a HDD to the host system.

10

11. The flash-memory card-reader system of claim 1;  
wherein the processing unit is operable to:  
translate outgoing commands issued by the flash-memory card-controller unit to produce translated outgoing commands; and  
provide the translated outgoing commands to the hard disk controller interface; and

15

wherein the hard disk controller interface is operable to receive the translated outgoing commands and provide the translated outgoing commands to the hard disk controller in the host system.

20

12. The flash-memory card-reader system of claim 11, wherein the translated outgoing commands comprise ATA commands.

13. The flash-memory card-reader system of claim 11, wherein the translated outgoing commands comprise SCSI commands.

25

14. The flash-memory card-reader system of claim 1, further comprising:  
an ATA register emulation unit coupled between the buffer and the processing unit, wherein the ATA register emulation unit is configured to store ATA command and status register information.

30

15. The flash-memory card-reader system of claim 1, further comprising:

a SCSI register emulation unit coupled between the buffer and the processing unit, wherein the SCSI register emulation unit is configured to store SCSI command and status register information.

5           16.     A flash-memory card-reader system comprising:  
            an IDE/ATA interface;  
            a buffer coupled to the IDE/ATA interface;  
            a processing unit coupled to the buffer; and  
            a flash-memory card-controller unit coupled to the buffer and to the processing  
10     unit;

            wherein the IDE/ATA interface is operable to communicate with an IDE controller in a host system, wherein the IDE/ATA interface is operable to receive incoming commands from the IDE controller; and

            wherein the processing unit is operable to translate the incoming commands to  
15     produce translated incoming commands usable by the flash-memory card-controller unit, wherein the processing unit is operable to provide the translated incoming commands to the flash-memory card-controller unit.

            17.     The flash-memory card-reader system of claim 16, wherein the incoming  
20     commands comprise ATA commands.

            18.     The flash-memory card-reader system of claim 16;  
            wherein the flash-memory card-controller unit is operable to access a flash  
memory card in response to the translated incoming commands.

25  
            19.     The flash-memory card-reader system of claim 16, further comprising:  
            a housing comprising at least one slot for receiving a flash-memory card;  
            wherein the flash-memory card-controller unit is coupled to the housing;  
            wherein the flash-memory card-controller unit is operable to access the flash-  
30     memory card in response to the translated incoming commands.

20. The flash-memory card-reader system of claim 19, wherein the IDE/ATA interface, the buffer, the processing unit, and the flash-memory card-controller unit are comprised in the housing.

5 21. The flash-memory card-reader system of claim 19, wherein the flash-memory card comprises one of a Compact Flash Card, a Secure Digital Card, a Multi Media Card, a Smart Media Card, and a Memory Stick Card.

22. The flash-memory card-reader system of claim 16, further comprising:  
10 a housing comprising one or more slots, wherein each respective one of the one or more slots is configured to receive a respective flash-memory card;

wherein the respective flash-memory card comprises one of the following types:

Compact Flash;  
Secure Digital;  
15 Multi Media;  
Smart Media; and  
Memory Stick; and

wherein the flash-memory card-controller unit is operable to access the respective flash-memory card in response to the translated incoming commands.

20

23. The flash-memory card-reader system of claim 16, further comprising:  
a housing comprising one or more slots, wherein each respective one of the one or more slots is configured to receive a respective flash-memory card;

wherein the respective flash-memory card comprises one or more of the following  
25 types:

Compact Flash;  
Secure Digital;  
Multi Media;  
Smart Media; and  
30 Memory Stick; and

wherein the flash-memory card-controller unit is operable to access the respective flash-memory card in response to the translated incoming commands.

24. The flash-memory card-reader system of claim 16;

5 wherein the flash-memory card-reader system appears as a HDD to the host system.

25. The flash-memory card-reader system of claim 16;

wherein the processing unit is operable to:

10 translate outgoing commands issued by the flash-memory card-controller unit to produce translated outgoing commands; and

provide the translated outgoing commands to the IDE/ATA interface; and

wherein the IDE/ATA interface is operable to receive the translated outgoing commands and provide the translated outgoing commands to the IDE controller in the  
15 host system.

26. The flash-memory card-reader system of claim 25, wherein the translated outgoing commands comprise ATA commands.

20 27. The flash-memory card-reader system of claim 16, further comprising:

an ATA register emulation unit coupled between the buffer and the processing unit, wherein the ATA register emulation unit is configured to store ATA command and status register information.

25 28. An integrated circuit, comprising:

an IDE/ATA interface;

a buffer coupled to the IDE/ATA interface;

a processing unit coupled to the buffer; and

a flash-memory card-controller unit coupled to the buffer and to the processing  
30 unit;

wherein the IDE/ATA interface is operable to communicate with an IDE controller in a host system, wherein the IDE/ATA interface is operable to receive first commands from the IDE controller; and

5 wherein the processing unit is operable to translate the first commands to produce second commands usable by the flash-memory card-controller unit, wherein the processing unit is operable to provide the second commands to the flash-memory card-controller unit;

wherein the flash-memory card-controller unit is operable to access a flash memory card in response to the translated incoming commands.

10

29. The integrated circuit of claim 28;

wherein the flash-memory card-reader system appears as a HDD to the host system.

15

30. The flash-memory card-reader system of claim 28;

wherein the processing unit is operable to:

translate third commands issued by the flash-memory card-controller unit to produce fourth commands; and

provide the fourth commands to the IDE/ATA interface; and

20

wherein the IDE/ATA interface is operable to receive the fourth commands and provide the fourth commands to the IDE controller in the host system.

31. A system comprising:

at least one IDE controller; and

25

a flash-memory card-reader interface;

wherein the flash-memory card-reader interface is operable to receive incoming commands from the IDE controller and translate the incoming commands to translated incoming commands usable by a respective flash-memory card;

30

wherein the flash-memory card-reader interface is further operable to access the respective flash-memory card in response to the translated incoming commands;

wherein the flash-memory card-reader interface is further operable to translate outgoing commands usable by the respective flash-memory card to translated outgoing commands usable by the IDE controller; and

5 wherein the flash-memory card-reader interface is further operable to provide the translated outgoing commands to the IDE controller.

32. The system of claim 31, wherein the incoming commands and the translated outgoing commands comprise ATA commands.

10 33. The system of claim 31, further comprising:  
a microprocessor coupled to the IDE controller.

34. The system of claim 33, wherein the microprocessor comprises an embedded microprocessor.

15 35. The system of claim 31, wherein the system comprises an embedded system.

36. The system of claim 31, further comprising:  
20 a housing comprising one or more slots, wherein each respective one of the one or more slots is configured to receive the respective flash-memory card;  
wherein the housing is coupled to the flash-memory card-reader interface; and  
wherein the respective flash-memory card comprises one of the following types:

25 Compact Flash;  
Secure Digital;  
Multi Media;  
Smart Media; and  
Memory Stick.

30 37. The system of claim 31, further comprising:



a housing comprising one or more slots, wherein each respective one of the one or more slots is configured to receive the respective flash-memory card;

wherein the housing is coupled to the flash-memory card-reader interface; and

wherein the respective flash-memory card comprises one or more of the following

5 types:

Compact Flash;

Secure Digital;

Multi Media;

Smart Media; and

10 Memory Stick.

38. A method for operating a flash-memory card-reader, the method comprising:

receiving incoming commands from an IDE controller;

15 translating the incoming commands to translated incoming commands usable by a flash-memory card-controller and providing the translated incoming commands to the flash-memory card-controller;

accessing a flash-memory card in response to the translated incoming commands;

20 translating outgoing commands issued by the flash-memory card-controller to translated outgoing commands usable by the IDE controller and providing the translated outgoing commands to the IDE controller.

39. The method of claim 38, wherein the incoming commands and the translated outgoing commands are ATA commands.

25

40. The method of claim 38, wherein the IDE controller is comprised in an embedded system.

41. The method of claim 38, wherein the outgoing commands issued by the  
30 flash-memory card-controller are in response to the translated incoming commands.

42. The method of claim 38, further comprising:  
transferring data from the flash-memory card to a host system that comprises the  
IDE controller;

5 and  
wherein said accessing comprises obtaining the data from the flash-memory card;  
wherein said transferring is performed in conjunction with said providing the  
translated outgoing commands to the IDE controller.

43. The method of claim 38, further comprising:  
10 transferring data from a host system that comprises the IDE controller to the  
flash-memory card;

wherein said accessing comprises writing the data onto the flash-memory card;  
and  
wherein said transferring is performed in conjunction with said providing the  
15 translated incoming commands to the flash-memory card-controller.